

## **REMARKS/ARGUMENTS**

### **In the Claims:**

Claims 3-10, 13-22, and 25-32 remain in this application. Claims 1-2, 11-12, and 23-24 have been canceled.

Claims 3, 4, 8-10, 13-15, 19-21, 25-27, and 31-33 were changed to make listings use "or" instead of "and." No new matter was added in those changes.

Claims 14 and 26 were modified for clarification by the addition of the phrase "disposed on a bonding substrate."

### **Claim Rejections**

Claims 3-10, 13-22, and 25-34 were rejected under 35 U.S.C. 103(a) as being unpatentable over Saitoh (U.S. 6,060,373) (hereinafter "Saitoh") in view of Grigg et al (U.S. 200210068453) (hereinafter "Grigg").

The cited references fail to disclose tape that includes a, "a flexible conforming layer," as recited in claims 3, 13, and 25. Tapes can include a conforming layer (Application, p. 7, lines 1-6; Fig. 2), or fail to include such a conforming layer (Application p. 5, lines 19-23; Fig. 1). Grigg's discussion of "a face tape" to provide "some additional protection" fails to disclose a flexible conforming layer of the tape (Grigg et al, page 8, [0065]). Because Grigg fails to disclose tape with a flexible conforming layer, the cited references fail to disclose all elements of claims 3, 13, and 25.

Claims 4, 15, and 27 were rejected because, "Saitoh discloses the under-fill layer 18 covering an entirety of bump-bodies." (Office Action at page 4). Contrary to the Examiner's statement, Saitoh does not disclose an under-fill layer. The Examiner admits this fact at page 3 of the Office Action. The claimed under-fill layer both provides support during a back grind process and provides underfill material during a mounting process. Saitoh discloses a protective film 18 that is subsequently **removed** before any mounting/underfill process. (Col. 2, Line 65 – Col. 2, Line 13). Thus, since the film 18 in Saitoh is removed, it does not act as underfill, and is not an underfill layer as recited by claims 4, 15, and 27.

Additionally, it is improper to combine Grigg and Saitoh to reject claims 4, 15, and 27 because both Saitoh and Grigg teach away from the invention as claimed. The claimed invention teaches at least a "pre-back grind under-fill layer **both** to provide ... back-grind wafer support ... **and** to provide under-fill material." (E.g. claim 4, emphasis added). Saitoh teaches away from using the protective layer as an under-fill layer. (Saitoh, FIGS. 1(A)-1(L)). Instead, Saitoh teaches the protective layer is **removed** immediately after back side grind. (Saitoh, FIGS. 1(A)-1(L)). The claimed invention also recites "the under-fill layer covering an **entirety** of bump bodies." (E.g. claim 4, emphasis added). Grigg teaches away from covering an entirety of bump bodies. Instead, Grigg teaches the molding is "dispersed between and around each of conductive bumps ... but not over a top portion of each conductive bump." (Grigg et al, page 7, [0061]; FIG. 5).

Further, it is improper to combine Grigg and Saitoh to reject claims 4, 15, and 27 because one of skill in the art would have no expectation of success from such a

combination. To establish a *prima facie* case of obviousness, there must be a reasonable expectation of success. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (MPEP, 8th ed., § 2143). Covering the tops of the conductive bumps, as taught in Saitoh, with an underfill material as taught in Grigg would create an inoperable device. Grigg teaches the underfill is a thermosetting material. (Page 6, [0057]). Grigg also teaches the die is connected to the substrate by reflow or cure. (Page 8, [0069]). A thermosetting material would harden during reflow or cure. If it covered the solder bumps, as in Saitoh, the material would not allow electrical contact between the solder bump and bond pad. Therefore, a device created by combining Grigg and Saitoh would not be functional.

In summary, in addition to Grigg and Saitoh failing to disclose each element of claims 4, 15, and 27, the prior art fails to suggest a combination as recited in Applicant's claims 4, 15, and 27. For a proper rejection under 35 U.S.C. 103(a) there must be some motivation, suggestion, or teaching **in the prior art** of the desirability of making the specific combination that was made by the applicant (*In re Kotzab*, 55 USPQ2d 1313 (Fed. Cir. 2000)). Since the references each teach away from the claimed invention and indicate that combining them would result in an inoperable apparatus, the prior art fails to provide such a suggestion or motivation. One of skill in the art would not combine the cited references as claimed without using Applicant's disclosure as a guide.

Claims 7-9, 18-20, and 30-32 were rejected because "Grigg discloses the underfill layer 30 comprise (sic) a thermoplastic polymer material." (Office Action at page 4). This is a mischaracterization of the facts. Grigg discloses a **thermosetting** material,

not a **thermoplastic** material. (Grigg et al, Page 6, [0057], emphasis added). The two are quite different and almost opposite in their behavior when heated. The thermosetting material disclosed by Grigg would not function properly when the material covers the solder bumps – it would not plasticize to allow bumps and lands to electrically interconnect. (See Application, Page 13, Lines 4-8). The thermosetting material of Grigg would just harden when heated and prevent a proper electrical connection.

Claims 10, 21, and 33 recite an “under-fill layer comprising an opaque material to provide at least one of light, ultra-violet (UV) light, or radiation protection.” The claimed invention teaches protecting the active wafer surface during tape removal using a radiation. (Application, Page 12, Lines 2-6). Contrary to examiner’s contention, the above limitation is not recited in Grigg. Grigg merely discusses a UV-sensitive tape to be used during grinding. (Grigg et al, page 8, [0065]). The Examiner seems to believe that to use a UV-sensitive tape as disclose by Grigg, an opaque under-fill layer must also be used. None of the cited references disclose such a mental leap. Applicant thus assumes that the Examiner is taking Official Notice of this. Applicant requests that the Examiner either withdraw the rejection or cite a reference disclosing that to use a UV-sensitive tape necessitates using an opaque under-fill material so that Applicants may prepare an appropriate response.

The cited references fail to disclose all elements of claims 14 and 26, as amended for clarification. The secondary underfill layer of the claims refers to an underfill layer on the structure to which the die/wafer is bonded. (FIG. 12, Reference

number 1250). In contrast, Grigg discloses dispensing more underfill material into a gap from the edges. (Grigg et al, Page 9, [0076]).

**Conclusion:**

Applicant respectfully submits that claims 3-10, 13-22, and 25-32 are patentable, and accordingly, the application is now in condition for allowance. Early issuance of the Notice of Allowance is respectfully requested.

The Commissioner is hereby authorized to charge shortages or credit overpayments to Deposit Account No. 500393. A Fee Transmittal is enclosed in duplicate for fee processing purposes. The Examiner is invited to call Gregory D. Caldwell at (503) 684-6200 if there remains any issue with allowance of this case.

Respectfully submitted,

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